

Command and Data Handling Branch Internship

Rachel Mae Billings

Modular Integrated Stackable Layers (MISL) is a computer system designed for simple, fast, and cost effective flexible reconfiguration in space environments such as the ISS and Orion projects for various uses. Existing applications include wireless and wired communications, data acquisition and instrumentation, and camera systems, and potential applications include bus protocol converters and subsystem control. MISL is based on Texas Instruments' MSP430 16 bit ultra-low power microcontroller device. The purpose of my project was to integrate the MISL system with a liquid crystal display touchscreen. The LCD, manufactured by Crystalfontz and part number CFAF320240F-035T-TS, is a 320x240 RGB resistive color screen including an optional carrier board.

The vast majority of the project was done with Altium Designer, a tool for printed circuit board (PCB) schematic capture, 3D design, and FPGA development. The new PCB was to allow the LCD to directly stack to the rest of MISL. Research was done with datasheets for the TI microcontroller and touchscreen display in order to meet desired hardware specifications. Documentation on prior MISL projects was also utilized. The initial step was to create a schematic for the LCD, power bus, and data bus connections between components. A layout was then designed with the required physical dimensions, routed traces and vias, power and ground planes, layer stacks, and other specified design rules such as plane clearance and hole size. Multiple consultation sessions were held with Hester Yim, the technical discipline lead for the Command and Data Handling Branch, and Christy Herring, the lead PCB layout designer in the Electronic Design and Manufacturing Branch in order to ensure proper configuration. At the

moment, the PCB is awaiting revision by the latter-mentioned branch. Afterwards, the board will begin to undergo the manufacturing and testing process.

Throughout the internship at Johnson Space Center, I gained several technical and professional skills. I gained proficiency in Altium Designer and experience using subversion clients, as well as knowledge in PSpice with OrCAD and battery design for spaceflight from on-site. I also gained networking, organization, and communication skills throughout meetings with coworkers and other interns. This internship at Johnson Space Center has impacted my future aspirations by further inspiring me to follow a career path into space rated engineering technology and human spaceflight applications. After graduation, I plan to attend graduate school for a master's or doctorate degree in electrical or computer engineering.